

the control of anthracnose in the southern states. The exact temperature range for *Ascochyta* and buckwheat was not determined.

Results obtained by other workers have shown that there is no definite optimum for infection, but that there is a wide range of temperature in which, providing some other factor does not interfere, the number of infections taking place does not vary much if the plant is exposed to infection for a sufficient length of time at the lower temperatures. These earlier results are borne out by the work of LAURITZEN. He concludes, therefore, that in considering control measures we must note not only the temperature which seems favorable to infection, but also the length of time for which the plant has been exposed.

The results he obtains from a study of the effect of humidity on infection lead him to point out that "the absence of certain diseases in semi-arid and arid regions where agriculture has been practised for long periods of time may be due in part to the small moisture content of the air," and that "seasonal variation in the moisture content of the air plays an important part in determining the amount of disease that develops." Because of the rather general belief that a film of moisture on the leaf surface favors infection, it is interesting to note the conclusion reached by the author that such a film is not essential. He considers it proved that, within certain limits of humidity, the spore is able to absorb sufficient water for germination, at first by imbibition and later by osmosis. He suggests also that in depressions of the leaf surface, especially above the stomata, the humidity may be high enough to make germination possible.—D. H. ROSE.

Life history and sexuality of Basidiomycetes.—Miss BENSAUDE³ has investigated *Coprinus fimentarius*, *Armillaria mucida*, and *Tricholoma nudum*. The work includes two phases: (1) the morphology and cytology of the mycelia, and (2) the results obtained from the study of the single spore cultures of *C. fimentarius*.

The mycelia of the 3 species were obtained from germinating spores as well as from material collected in the field. The author accepts FALCK's classification of the mycelia into primary, secondary, and tertiary forms. The claim is made that the first few days after the germination of the spores the resulting mycelia belong to the primary class, in which the hyphae are partitioned off into cells which contain from one to many nuclei. These uninucleate cells may give rise to varying numbers of uninucleate oidia. Disarticulated hyphal cells, which she calls "pseudoidia," are also formed which, like true oidia, may germinate. The nuclei in the germ tubes divide amitotically. Cross-walls with clamp connections never appear in the hyphae of the primary mycelia. Miss BENSAUDE grew single spores of *C. fimentarius* in pure cultures, and succeeded in isolating 10 single spores. Of these, 4 germinated, and in 2

³ BENSAUDE, MATHILDE, Recherches sur le cycle évolutif et la sexualité chez les Basidiomycètes. Dissertation. pp. 156. pls. 13, figs. 30. Nemours. 1918.

cultures primary mycelia were obtained which did not produce carpophores. When parts of each mycelium were mixed in a culture, a secondary mycelium appeared and fruit bodies were produced. The chief method of bringing about the plasmogamy is through the union of a hyphal cell of one thallus with an oidium from another thallus. Miss BENS AUDE concludes that the "dicaryon" in *C. fimetarius* is formed following plasmogamy between cells coming from 2 different thalli.

The transformation of a primary mycelium into a secondary mycelium is very difficult to observe. This is brought about by the anastomosis of 2 hyphal cells of different thalli in *C. fimetarius*. The fusion of 2 such cells (plasmogamy or pseudogamy) introduces the cytoplasm and nucleus or nuclei of one cell into the other, which results in the establishment of a binucleate cell. If 2 cells unite which have more than 2 nuclei in common, all disintegrate but 2. The uninucleate oidium may fuse with a hyphal cell, and this is a very common means of bringing about the initial binucleate condition of the cell.

Each cell in these secondary hyphae is binucleate, constituting a "dicaryon." Conjugate nuclear division occurs in these hyphae as a rule in the apical cell, although intercalary cells divide occasionally. At the time of division the 2 nuclei move to the middle of the cell, and the actual process of cell division is preceded by the formation of a protuberance which is to form a clamp. One of the nuclei, which Miss BENS AUDE calls (+), on the basis of her results with single spore cultures, enters this very short branch, and the (-) nucleus remains at about the same level in the mother cell. Spindles are formed and conjugate nuclear division takes place. One of the (+) daughter nuclei goes back into the mother cell, and the other goes to the apex of the young clamp. A cross-wall cuts off the beak cell from the mother cell. Of the 2 (-) daughter nuclei, one goes to the apical part of the mother cell and the other to the basal part, and a cross-wall is formed at the level of the young clamp, dividing the cell into an apical portion with (+) and (-) daughter nuclei and a basal cell with only the (-) daughter nucleus. The little beak now fuses with the basal cell, and its nucleus passes into this cell, so that it also becomes binucleate. Very often the apex of the beak fuses with the mother cell before nuclear division takes place.

Reversion of secondary to primary mycelium occurs, in which case a uninucleate cell appears among binucleate cells. No clamps are found on the cross-walls of this cell, and these uninucleate cells may bear oidia.—MICHAEL LEVINE.

A new conception of sex.—JONES⁴ presents a conception of sex which is quite unorthodox, but at least it furnishes considerable food for thought. This author sees in fertilization an "attack" of a "parasitic" male gamete

⁴ JONES, W. N., On the nature of fertilization and sex. *New Phytol.* **17**:167-188. 1918.